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Final Report of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer to the Trade and Development Board

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PART ONE

Conclusions and recommendations

INTRODUCTION

1. Pursuant to the Cartagena Commitment, the Trade and Development Board by decision 398 (XXXVIII) established the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer. At its first session, the Working Group adopted its Work Programme defining broadly the objectives of the exercise, the specific issues to be examined and discussed, as well as the broad lines on how the work was to be organized and carried out. The Group identified the following three main issues for examination and discussion:

- Investment flows, transfer of technology and competitiveness;
- Technological capability-building in developing countries, particularly the least developed countries, and in countries undergoing the process of transition to market economy;
- Transfer and development of environmentally sound technologies.

METHOD OF WORK AND DELIBERATIONS

2. The Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer held a total of three sessions within a period of 15 months (January 1993 to March 1994), totalling 15 working days.

3. The Group comprised experts from Governments, academia and the enterprise sector. In line with the nature of the Group, most of the deliberations were informal. On one specific issue - environmentally sound technologies - the Working Group drew on the results of a Workshop organized by the UNCTAD secretariat and the Government of Norway, in Oslo, from 13 to 15 October 1993 (UNCTAD/ITD/TEC/13).

4. A key component of the work of the Working Group was the presentation of 19 case studies specially prepared by member Governments for the consideration of the Group. The coverage and contents of the case studies enabled the Group to have an overview of the problems, issues and expectations of countries at different stages of development. The full report of the activities of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer is to be found in Part Two.

5. At the request of the Working Group, the secretariat prepared a number of background materials that assisted the Group in carrying out its mandate. In this connection, the Group recognizes the special contributions made by countries which prepared case studies and other Governments that contributed to the success of the exercise. A number of institutions also contributed to the work of the Ad Hoc Working Group in the form of expert advice provided during the deliberations.

6. During the course of its deliberations, the Group referred to different, though interrelated, issues which include:

- the role of the State;
- policies to promote technology and investment flows and technological innovation;
- human resources development and institution-building;
- mechanisms of technology transfer;
- intellectual property protection;
- factors affecting competitiveness;
- the role of SMEs.

7. The Ad Hoc Working Group has carried out its work programme. The Group does not put forward any prescriptive solutions. However, the Working Group does offer for the consideration of member Governments of UNCTAD the following findings and conclusions, which include policy options and recommendations.

MAIN FINDINGS

8. The world today is very different from that which prevailed two to three decades ago when an inward-oriented and State-led industrialization strategy was the dominant approach adopted by many countries. Increasing liberalization trends, adoption and implementation of structural adjustment programmes, changes in the international division of labour and greater cooperative arrangements among enterprises have, in a period of rapid technological change, created a new setting for investment and technology flows.

9. Technology is vital for achieving economic development and sustaining competitiveness. The process of gaining technological capability, however, is not instantaneous, costless or automatic, even if the technology is well-diffused elsewhere. Apart from physical inputs, it calls for various new skills, technical information and services, contract research facilities, interactions with other firms, equipment suppliers, standards' bodies, and so on. The setting up of this dense network of cooperation requires the development of special skills and a favourable economic, institutional and legal environment.

10. All countries, particularly developing countries, can benefit from imported technologies to establish and strengthen local technological capability, including, inter alia, the ability to acquire, absorb and adapt new and emerging technology, and to improve their international competitiveness. These technologies are obtained largely through foreign direct investment (FDI), including joint ventures and capital goods imports. However, in recent years, other channels of transferring technology such as licensing, management contracts, subcontracting and franchising have also

grown in importance, including those within the framework of mutually respectful strategic technological partnerships. The efficiency of use of the imported technology and its contribution to the upgrading of a local technological base vary in accordance with the complexity of the technology involved and with existing capabilities.

11. FDI and technology transfer based on equality and mutual benefit are favourable to both sides, namely technology suppliers and recipients. Therefore, the importance of technology transfer lies not only in the benefit accruing to both sides, but also the overall development of the world economy, and particularly that of the developing countries.

12. The relationship between foreign investment flows and the building of technological capacities runs in both directions. While investment flows present the opportunity for acquiring and absorbing technology, it has become apparent that investment is attracted most strongly to those countries that have adopted measures to strengthen their domestic technological capability and create an overall policy framework conducive to innovation, investment in infrastructure, intellectual property protection, human capital formation and a stable macroeconomic and regulatory environment. Other factors such as market size, natural resource endowment and factor costs also affect locational decisions of firms. At the same time, FDI and any transfer of technology therein has clearly been a highly convenient medium for the provision of training opportunities and positive structural adjustment by developed and more advanced developing countries in addition to R & D cooperation schemes for the benefit of the recipient countries.

13. However, Government efforts have not necessarily elicited the desired effect in terms of additional investment and technology flows by firms. This is especially so in cases where temporary bottlenecks and uncertainties resulting from structural adjustment changes have had, at least in the short-term, an influence on investment flows and thereby on innovation and transfer of technology.

14. In most developing countries, the process of technological capability-building may be hampered by, inter alia, declining rates of investment, misallocation of resources, external imbalances, lack of diverse and sophisticated skills and weak linkages between domestic R & D institutes (particularly in the public sector) and enterprises as well as unfavourable external factors.

15. In this context, the problems faced, particularly by the least developed countries, need special attention. For these countries, new policy approaches which recognize the role of market mechanisms may be necessary to tackle the constraints associated with the acquisition and building of technological capabilities.

16. The problems faced by developing countries and countries in transition also require special consideration, particularly with respect to their need to formulate appropriate strategies on FDI and transfer of technology.

17. In developing technological capabilities, it is essential to create and improve those capabilities that are consistent with economic efficiency and building of international competitiveness. In a period of rapid technological change, competitiveness depends both on the acquisition of new knowledge and organizational capability and on cost factors. This involves a shift from the focus on R & D as an end in itself to R & D as a means for facilitating the assimilation of imported technologies, acquiring better methods of production, increasing efficiency, strengthening skills, developing endogenous technologies and new and improved products as well as identifying new market niches.

18. It also involves the setting of adequate industrial standards, establishment of marketing and distribution networks and the creation of a managerial and organizational framework that fosters sensitivity to customers' needs, dependable service and a quick response to shifting demand patterns. Increasingly, keeping pace with technological change means inter-firm cooperation and the formation of strategic alliances as a means of sharing capabilities and distributing the burden of risk in investing in innovations.

19. Technology policy needs also to be coordinated and synchronized with industrial, investment and trade policies. Overall, the policy direction should be geared to policies that are more market-oriented, open to trade and foreign investment and that encourage linkages between R & D institutes and enterprises.

20. Similar findings were observed in the Oslo Workshop on environmentally sound technologies (ESTs) which emphasized the key role played by enterprises in the generation and transfer of ESTs and in improving environmental conditions. The contribution of private enterprises to these objectives is heavily dependent, however, on Governments providing the necessary framework to create demand for such technologies, notably in the form of laws and regulations on environmental protection, as well as measures aimed at internalizing environmental costs and other economic incentives. In view of the benefits inherent in ESTs, there is also a strong case for Governments to engage actively in promoting the generation and dissemination of ESTs, and also to strengthen international cooperation to that end.

21. Any meaningful exploration of investment and technology-related issues should be grounded on a clear grasp of prevailing conditions, the underlying trends and salient policy issues. However, there is a lack of appropriate science and technology indicators that may be relevant for analysing technological trends and assessing the impact on developing countries.

GENERAL CONCLUSIONS

22. Efforts towards promoting technology transfer and technological capability-building in developing countries and countries in transition need to be coupled with a market-based trade and investment policy and pricing system, and with a stable macroeconomic environment for business activity, conducive to overall economic growth and employment. Additional elements of that framework are Trade Related Investment Measures (TRIMs) - consistent investment regimes as well as bilateral and multilateral agreements. In order

to maximize the efficient use of technology, technology transfer must take place, particularly in the case of developing countries, either as part of international commerce, or included within bilateral or multilateral assistance programmes.

23. With respect to the least developed countries, industrialized countries, private enterprises and international institutions need to keep in mind the need to improve the understanding of the policy approaches necessary to foster technological capability-building in these countries. While UNCTAD, United Nations agencies and other institutions dealing with development issues, academia, and the private sector will play an important role in developing this understanding, the support of the international community will be vital to this effort.

24. Qualified human resources, especially skilled personnel, are critical to the development of technological capability. For this purpose, countries need to pay more attention to continuous skill upgrading, including terminology-based knowledge transfer, and organize their institutional set-up as well as their educational and training system in line with the needs and requirements of the productive sector.

25. Closer linkages between R & D activities and the productive sector must also be established. A strategy, therefore, is deemed to be necessary for mobilizing and effectively utilizing resources for the commercialization of R & D results and for responding better to the needs of the productive sector.

26. While the role of government remains vital in the process of building technological capabilities, it is increasingly recognized that there is a need for closer collaboration between business, academia and Government in order to take into account the motivations and needs of the productive sector in the formulation of policies. However, differences in levels of economic and technological development may call for different sets of policy mix and approaches toward capacity-building.

27. In the post-Uruguay Round period, intellectual property rights protection is deemed to constitute an important component of an environment conducive to international transfer of technology, including FDI. Further studies and technical assistance, in collaboration with the World Trade Organization (WTO) and the World Intellectual Property Organization (WIPO) may be needed in order to elucidate the relationship between intellectual property rights and transfer of technology, particularly for the implementation of the GATT Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), taking into account the characteristics of contemporary knowledge, inventions and ownership.

28. Given the role of enterprises in the development and use of technology and results of scientific research, any discussion in international forums on science and technology policy cannot be separated from the role of enterprises which are important vehicles for technical change and technological capability-building.

29. Successful FDI and transfer of technology cannot be separated from industrialized countries' active dedication to and participation in helping developing countries, and the least developed countries in particular, in their acquisition and enhancement of technology capabilities through the means of FDI, technology licensing and expert advice.

RECOMMENDATIONS

30. The Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer recommends that UNCTAD's work in the interrelated areas of investment, technology and international competitiveness be focused on specific issues so as to better respond to the changing concerns and needs of member States, and that emphasis be placed on the need for flexibility in the method of work which could, inter alia, include intergovernmental deliberations, technical assistance activities, seminars, workshops and conferences. The UNCTAD secretariat is encouraged to work closely with Governments, the enterprise sector and other organizations at the national, regional and international levels.

31. The Ad Hoc Working Group, in the light of its relevant findings and conclusions, recommends that the following specific actions be considered by UNCTAD in coordination with the appropriate international organizations:

(a) Undertake a project, within UNCTAD, specially designed to foster the technological capability-building in the least developed countries. The Secretary-General of UNCTAD is requested to implement this project jointly with interested least developed countries and by seeking expertise and support of the international community, and to report the results of this project to the appropriate intergovernmental machinery of UNCTAD;

(b) Organize a world dialogue among Governments, enterprises and the academic sector for the purpose of exchanging views and formulating proposals for technological cooperation;

(c) Assist developihg countries, in particular the least developed countries, in fostering entrepreneurship through the transfer of technology and managerial skills, and developing the framework and mechanisms for technology partnerships between enterprises, with special attention to small and medium-sized enterprises and their representative organizations;

(d) Examine measures, in particular in the field of training and education, aimed at engaging more fully the creative potential of small and medium-sized enterprises in the generation and dissemination of environmentally sound technologies, through, inter alia, building networks and other channels of information.

32. The Ad Hoc Working Group recommends the following issues for further analysis and consideration by UNCTAD in coordination with the appropriate international organizations:

(a) Ways and means to enhance policies and mechanisms that have an impact on investment and technology flows;

(b) The role of incentives and other inducements in stimulating investment that contribute to strengthening technological capabilities of the technology-recipient countries;

(c) Strengthening of networking arrangements, through investment and other means, among enterprises in countries at different stages of development for the promotion of innovation and productivity growth in developing countries;

(d) Ways and means to implement the provisions of the GATT Agreement on TRIPS in coordination with WTO and WIPO;

(e) Enhancing activities on the interrelationship between environmentally sound technologies, trade and development.

PART TWO

Report of the activities of the Ad Hoc Working Group

I. Background

33. Pursuant to "A new partnership for development: the Cartagena Commitment", adopted at the eighth session of the Conference, and on the basis of Board decision 398 (XXXVIII), which sets out in annex C the terms of reference of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer, three sessions of this Group were held, respectively, on 25-29 January 1993, 13-17 December 1993 and 21-25 March 1994.

34. These meetings helped to provide further insights into the consideration of investment-related technology issues in a changing global context. Increasing liberalization trends, coupled with growing interdependence among nations, the adoption and implementation of structural adjustment programmes, changes in the international division of labour and greater cooperative arrangements among enterprises have, in a period of rapid technological change, created a new setting for investment and technology flows and opened up further possibilities for international economic cooperation.

35. After a period of stagnation, investment flows to a number of developing countries have expanded. However, certain countries were able to attract more of these flows, while others drew but little benefit from these new trends. Technological capacity-building in some countries, particularly developing countries and countries in transition to a market economy, has also progressed in varying degrees, reflecting different and changing national circumstances in a rapidly evolving international environment that required adjustment and further efforts from all actors, including Governments and private enterprises.

II. Overview

A. First session

36. It is against this background that the first session of the Ad Hoc Working Group was held in January 1993. In opening the debate, three guest speakers invited by the secretariat addressed the Working Group on investment-related technology issues.

1. Guest speakers

37. Professor Charles Cooper, Director of the Institute of New Technologies, United Nations University, Institute of New Technologies (UNU/INTECH), spoke on three main issues: (i) the evolution in the process of industrial competition; (ii) how problems of competition relate to industrialization policies in developing countries; and (iii) implications for policy-making. Mr. Juan Rada, Vice-President (Strategic Alliances), Digital Equipment Corporation International (Europe), addressed three issues that affect competition policies: (i) the clustering of technologies and strategic alliances; (ii) the role of capital markets in shaping investment and

innovation capabilities; and (iii) technology as a factor affecting trade in the post-Uruguay Round period. Herbert Oberhänsli, Assistant for Economic Affairs to the Chairman, Nestlé S.A., referring mainly to Nestlé's experience and to the results of the survey undertaken by European industrialists, outlined the systems of cross-fertilization between economies at different stages of economic development, which stimulated local knowledge creation in production and distribution.

38. The experts' presentations and the discussion which followed them have been included in the "Report of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer at its first session" (TD/B/WG.5/4).

2. Secretariat documentation

39. The secretariat made available two documents for the session - a note and a background document entitled, respectively: "Issues for consideration in the establishment of the work programme" (TD/B/WG.5/2) and "The interrelationship between investment flows and technology transfer: an overview of the main issues" (UNCTAD/ITD/TEC/1).

40. The issues and concerns raised in these documents and the discussions which led to the adoption of the work programme have also been covered in the report of the first session (TD/B/WG.5/4).

3. Outcome

(a) The process

41. The interventions by the guest speakers and the secretariat documentation led to stimulating discussions among the experts whose experiences enriched the debate, helped to set the direction of the work and determined the characteristics of the process that was to guide the deliberations of the Ad Hoc Working Group. In line with the Cartagena Commitment, the work was seen as a consensus-building and action-oriented process and the output as a major report on investment and technology. The report was to reflect, inter alia, (i) the results of discussions at meetings within the Ad Hoc Working Group, and (ii) country case studies.

(b) Specific issues

42. At its first session, the Ad Hoc Working Group agreed on the following three main sets of issues that constitute the components of the unifying theme of the interrelationship between investment and technology transfer:
(a) investment flows, transfer of technology and competitiveness;
(b) technological capacity-building in developing countries, particularly the least developed countries and countries in transition to a market economy; and
(c) transfer and development of environmentally sound technologies.

(c) Method of work

43. Besides agreeing on its work programme, the Ad Hoc Working Group defined its method of work which was to centre on the exchange of national experiences based on case studies prepared by countries on a voluntary basis. It also requested specific inputs by the UNCTAD secretariat, which were reflected in the secretariat documentation submitted to the second and third sessions, and the organization of a workshop in cooperation with the Norwegian Government on the "Transfer and development of environmentally sound technologies".

B. Second session

1. Guest speakers

44. Based on the agreed work programme, including the orientations and directives given at its first session, the Ad Hoc Working Group held its second session in December 1993. It benefited from the intervention of six guest speakers from different backgrounds, who had been invited by the secretariat. The presentations and the ensuing discussion have been reported in the summary report of the "Informal discussions during the second session of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer" (annex I).

45. The informal discussions opened with a keynote address by Professor Lynn Mytelka (Carleton University, Ottawa, and LAREA-CEREM, Université, Paris-X) on the theme of strategic partnering and its implications for developing countries. Professor Mytelka argued for the relevance and importance of strategic partnerships within and across developing countries as an important means of technological capacity-building and of raising competitiveness in these countries. She underlined the need for institutional mechanisms that would support the development of networking at the national, regional and international levels, supported by both the private and public sectors.

46. The Ad Hoc Working Group also had an opportunity to hear the views of the private sector on foreign investment and technology transfer to developing countries and countries in transition. Mr. Samir Marrakchi (President and Director-General of the Société de Participation et de Promotion des Investissements (SPPI), Tunisia), Mr. Viorel Catarama (President and Director-General of Elvilla International, Romania), and Mr. Joseph Brenner (Development Consultant, Du Pont de Nemours International, Switzerland), addressed the Group and participated in the general discussion, as well as in a panel discussion on technological capacity-building in developing countries.

47. The panel discussion was organized for the purpose of providing further insights into the issues under discussion. Mr. Samuel Wangwe (UNU/INTECH), Mr. Tom Ganiatsos (UNCTAD), and Mr. Jorge Katz (ECLAC) presented the results of research being carried out respectively in Africa, Asia and Latin America. The presentations by the experts were followed by a fruitful exchange of views on such diverse issues as: the need to distinguish between firms' and national policies and strategies; the role of infant industry protection and the importance of macroeconomic stability.

2. Case studies

48. The meeting also benefited from the presentation of 15 case studies submitted by countries at different stages of development and facing different situations. The studies, in order of presentation, are included in annex I.

49. These case studies and their presentations have given an account of the opportunities and challenges faced by those countries and their enterprises in promoting investment and technological capacity-building. They have stimulated discussion and promoted the sharing of experiences and perceptions in this area. The discussion contributed to the process of learning in the formulation and implementation of investment-related technology polices. It also helped to identify areas where some progress had been made and where further efforts needed to be concentrated (see annex I).

50. More specifically, it highlighted the efforts deployed in promoting technological capacity-building and the role of technology transfer in this regard. The contribution of foreign technology inputs to capacity-building was emphasized, including ways and means of strengthening this relationship. Particular attention was given to capital goods imports and foreign direct investment as two important channels of technology transfer. It was noted that modalities of technology transfer had diversified to include less standard forms involving different actors. In this respect, the means in use encompassed new forms of investment, such as joint ventures, management contracts, subcontracting and franchising. Licensing, literature surveys, scientific exchange and participation in fairs were other less formal modes of technology transfer.

51. Different countries pointed to the reforms carried out and incentives adopted to liberalize their foreign investment regimes and attract investment and technology flows. These incentives included a more stable regulatory framework, improvement of intellectual property rights protection, relaxation of conditions and easing of registration procedures for foreign investment, development of science and technology infrastructure, progress in human resources development, modernization of the production sector, financial and fiscal incentives, and more coordinated industrial and trade policies.

52. Education was given particular attention at all levels in the process of technological capacity-building, including formal education and technical and vocational training. The institutional set-up required for human resources development was also emphasized. The role of public and private training facilities was singled out, including at the firm level, as well as the upgrading of skills of both trainees and trainers. In view of the rapid changes in technology, it was considered essential for training and explicit learning from experience to be a continuous activity at all levels. While some progress had been made in training and institution-building in many countries, linkages with the production sector remained weak.

53. This also applied to linkages between research and development (R & D) and industry. A closer relationship would facilitate the commercialization of R & D results. It was deemed necessary to make more effective use of R & D resources and for the private sector to play a more active role in financing

and carrying out such activities. In this respect, particular attention was given to the creation of conditions favourable to the development of small and medium-sized enterprises to enable them to become more active agents in the transfer and development of technology. Moreover, the development of R & D capacity was viewed as an important element in the process of technological innovation, and related policies had been promoted in varying degrees by all countries.

54. Efforts to promote technological capability-building, including technological innovation coupled with a stable macroeconomic and regulatory environment, created favourable conditions for enhancing international competitiveness. Selecting among competing priority areas those on which countries could concentrate their human and financial resources had, together with flexibility, become a particularly important area for policy discussions, besides being an element in the policies of Governments and enterprises in the present period of rapid change. However, differences in the levels of development and situations of countries called for different sets of considerations and differing approaches to capacity-building and competitiveness. This might be even more necessary at a time when integrating environmental considerations was increasingly becoming a fundamental element in meeting sustainable development objectives.

3. Environmentally sound technologies

55. In accordance with its work programme, the Ad Hoc Working Group considered the issue of the transfer of environmentally sound technologies. It had before it the report of the Workshop on the Transfer and Development of Environmentally Sound Technologies (ESTs) (UNCTAD/ITD/TEC/13), which had been organized jointly by the UNCTAD secretariat and the Government of Norway in Oslo from 13 to 15 October 1993.

56. According to the findings of the Workshop, integrating environmental considerations into endeavours to meet sustainable development objectives would entail the assessment of environmental impacts at the initial planning stage of project execution. While the role of the private sector in generating and transferring such technologies was underlined, emphasis was also laid on the need to develop domestic capabilities for harnessing imported technology to promote sustainable development. The presentation and discussion of case studies threw further light on these considerations and approaches.

57. The conclusions of the Workshop included a wide array of suggestions. Attention was drawn to a number of initiatives and priority elements that had already been taken up and were in the process of being implemented, sometimes on an experimental basis.

58. The discussion in the Ad Hoc Working Group touched upon certain specific points such as: the role played by the private sector in R & D and dissemination of ESTs; the impact of structural adjustment programmes on EST diffusion in developing countries in this respect; factors that affected the

diffusion of ESTs; the importance of training in capacity-building for ESTs as for other technologies; and the need for special mechanisms to diffuse ESTs more broadly in developing countries (see annex I).

4. Secretariat documentation

59. During its second session, the Ad Hoc Working Group also considered two secretariat documents submitted, namely, "The review of the work of the United Nations system and selected organizations dealing with investment-related issues" (TD/B/WG.5/6) and "Fostering technological dynamism: evolution of thinking on technology capacity-building and competitiveness" (TD/B/WG.5/7).

60. The former document provided inputs concerning the contributions by various organizations of the United Nations system and other organizations, in their respective fields of competence and in diverse sectors as well as through policy research and technical cooperation activities, to promoting foreign direct investment and linking it to local technological development opportunities, including capability-building. Human resources development and institution-building have also been the focus of attention of many of these organizations in their operations in different countries in Africa, Asia and Latin America. These organizations have also supported intergovernmental consideration of approaches for promoting sustainable development, including through the setting-up of data bases to help in the dissemination of information concerning the sources, transfer and development of environmentally sound technologies.

61. As the review and analysis of the literature showed (TD/B/WG.5/7), technology and the process of technological change have been increasingly recognized by scholars, decision-makers and policy-makers as an important factor in economic growth and international competitiveness. The growing preoccupation with technology has been accompanied by important shifts in emphasis from technology transfer per se to how nations use imported technology to complement their own efforts to accumulate internal technological capabilities. There has also been a growing recognition of the importance of the enterprise as the locus for technological innovations, and of the need for the development of linkages among domestic and external sources of technology. The debate on strategies for achieving national competitiveness has become more focused, with emphasis being placed on selectivity, flexibility and provision of incentives in addition to the provision of a stable macroeconomic environment.

62. As regards the least developed countries and low-income regions elsewhere, knowledge about workable technological strategies for industry remains extremely inadequate. In contrast, as regards agriculture, a better understanding of the effects of the green revolution has demonstrated that strategies for agricultural development have often been a rather crude attempt to deal with what has now emerged as a sophisticated system of resource management.

63. The report (TD/B/WG.5/7) identified a number of areas where further work could be considered. Most of these were highlighted during the discussions on

the case studies. They included: technology and strategic partnerships; science and technology policies and cohesiveness with other major policies; incentives and support for innovative behaviour; the need for a better understanding of the workings of selective intervention, including criteria for selection and evaluation of policies. Similarly, further empirical research would be needed on developing country experience with intellectual property protection. For the least developed countries, research would be needed on ways whereby developing countries could gain enough expertise to identify desired technologies. Political economy-oriented research would also be needed to identify policy options available to the international community that could (i) encourage greater diffusion of technology, (ii) make a real impact on reducing the marginalization of some countries and (iii) assist in building a broad consensus between donors and aid-receiving countries. Finally, in this respect, more research would be needed to obtain a better understanding of the process of innovation, including the linkages between technology transfer and the development of technological capabilities.

64. In the light of the discussion (see annex I), the secretariat made a number of suggestions for revision to the documents TD/B/WG.5/6 and TD/B/WG.5/7, which were reproduced, respectively, in documents TD/B/WG.5/6/Amend.1 and TD/B/WG.5/7/Amend.1.

C. Third session

1. Guest speakers

65. The third and final session of the Ad Hoc Working Group was held in March 1994. Seven guest speakers from the enterprise sector were invited to exchange views on investment-related technology issues. Their presentations and the ensuing discussions are included in the summary report of the "Informal discussions at the third session of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer" [annex II].

66. The informal discussions opened with a keynote address by Mr. Hari Shankar Singhania (President, International Chamber of Commerce) on ways of establishing a favourable environment for foreign investment and technology transfer. Reflecting on transnational corporations (TNCs) as the main source of foreign capital and technology, Mr. Singhania argued that the most effective cases of attracting investment and technology were found when Governments created favourable conditions for the operation of firms, including political and macroeconomic stability, facilitation of capital movements, availability of an educated and skilled labour force, a supportive legal environment and infrastructure, and demonstrated long-term commitment to growth. Mr. Singhania also discussed the case of the successful East Asian economies which combined policies to strengthen their economic base with foreign know-how and which shifted in due time from inward to export orientation.

67. The Ad Hoc Working Group also benefited from presentations by guest speakers from the enterprise sector on their perceptions of the roles of foreign direct investment, technology transfer and technological capability-building in achieving competitiveness. The speakers were:

Mr. Emerson Kapaz (General Coordinator, Pensamento Nacional das Bases Empresariais, Sao Paolo, Brazil), Mr. Strive Masiyiwa (Managing Director, Retrofit, Harare, Zimbabwe), Mr. Herman Montenegro, Chamber of Commerce and Industry, Manila, Philippines), Mr. John Morton (Executive Director, British Technology Group, London, United Kingdom), and Mr. Roger Short (Projects Director, Small Enterprise and Local Economic Development Association (SELEDA), Bologna, Italy).

68. The presentations were followed by informal discussions in which the guest speakers elaborated on critical issues and addressed concerns raised by experts. The issues included, inter alia, the establishment of effective intellectual property rights systems and the impact on investment, technology transfer and technological innovation of the GATT agreement on TRIPS; the role of small and medium-sized enterprises in developing countries and the possibilities of strengthening their technological capacities; the effects of private and public ownership on investment and technology transfer; the importance of linkages between enterprises, universities and research institutions; and the need for greater investment in education and enterprise-level training.

2. Case studies

69. The meeting benefited from the presentation of four case studies submitted by developing countries. The studies, in order of presentation, are listed in annex II. A presentation was also made by the expert from Austria.

70. The case studies and presentations highlighted many of the issues raised in the 15 case studies discussed at the second session of the Ad Hoc Working Group. More specifically, however, they underlined the challenges and opportunities faced by developing countries, particularly the least developed countries and countries in transition to a market economy, in attracting foreign direct investment, acquiring technology and building technological capabilities. They also highlighted the efforts of Governments and the enterprise sector to attract investment and technology flows, develop the innovative capacity of domestic firms and achieve international competitiveness.

71. The case studies showed that the contributions of technology transfer to technological development and economic growth depended not only on the policies in place but also on the technological behaviour of recipient firms - both during the technology transfer phase and the subsequent phase of production. Equally important were the level of linkages among and between enterprises and research institutions, the availability of qualified technical personnel and the support provided in the field of standardization, quality control, patent information, etc.

72. The case studies stimulated discussion on the special problems faced by the least developed countries in building technological capability in an economic environment characterized by globalization of markets. In that context, particular attention was given to upgrading of scientific and technical personnel, strengthening of linkages between R & D activities and production and creating the institutional mechanisms for the development of

networking at all levels (national, regional and international) supported by the private and public sectors. The need for new and innovative policy approaches to tackle the constraints associated with technological development efforts of the least developed countries was emphasized.

3. Secretariat documentation

73. During the third session, the Ad Hoc Working Group considered a document prepared by the secretariat, namely, "Laws and regulations dealing with the transfer and development of technology: an overview" (TD/B/WG.5/10).

74. According to the overview, considerable attention had been given in recent years both at national and international levels to the creation of a legal environment conducive to technology transfer and development. This had led a number of Governments to formulate laws and regulations relating to the transfer, development, adaptation and diffusion of technology. Most developed countries had introduced changes in their competition laws and enforcement policies on restrictive practices in order to stimulate technical innovation, and had passed laws to protect new technologies such as biotechnologies and semiconductor integrated circuits. The main focus in the developing countries was on the formulation of policies and legislative instruments for the promotion and encouragement of foreign investments and related technology transfer. Many developing countries had liberalized their investment and technology transfer legislation in order to attract more investment. The new approach taken by countries towards technology transfer was focused more on effective collaboration between partners involved in transfer arrangements rather than on the control of contractual aspects of transactions. More recently, a number of developing countries had also modified their intellectual property legislation to strengthen protection of intellectual property rights or introduce new enforcement measures. At the multilateral level, protection of intellectual property rights had, for the first time, been linked to multilateral trade rights and obligations as a component of the international trading system (Final Act of the Uruguay Round).

ANNEX I

Informal discussions at the second session of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer (13-17 December 1993)

Summary report prepared by the UNCTAD secretariat

A. Keynote address, guest speakers and panel discussion

1. Keynote address

1. The informal discussions of the Ad Hoc Working Group opened with a keynote address by Professor Lynn Mytelka on the theme of strategic partnering and its implications for developing countries. In the past, investment had been seen in terms of equity and control. Today it was based on new forms of inter-firm collaborative agreements, better known as strategic partnerships, that contributed more directly to structural competitiveness. Strategic partnerships distinguished themselves from conventional forms of investment in that they were two-way partnerships based on joint and shared production of knowledge as opposed to one-way relationships based on licensing agreements. Many supplier-client relationships in industries as diverse as the automobile, aircraft and clothing industries were being transformed from simple subcontracting arrangements into two-way partnerships where both parties contributed to the design and development of components and final products.

2. However, the ability to form strategic partnerships within and across developing countries depended upon policies that consciously strengthened the science and technology sector and its links to production in the developing world. There was, thus, an important role for local, regional and national Governments to play, individually and in concert, in providing the leadership and creating the policy incentives needed to change traditional habits and practices. Designing programmes to promote strategic partnership at the national and regional levels and leveraging business-finance R & D expenditures through Government funding of technology development and diffusion activities have proven to be powerful instruments altering the historic practices of firms and in stimulating innovation and diffusion in some developed countries.

3. While a number of programmes that laid the building-blocks for innovation had also been developed in some of the more advanced developing countries, similar developments had yet to emerge in the least developed countries. The Governments of these latter had, however, acknowledged the need to develop training that promotes innovation as well as attempting to put in place a policy environment conducive to innovation. To complement these efforts, a mechanism was needed, particularly for Africa, through which enterprises would be encouraged to identify problems and to innovate and through which local resources would be marshalled in support of this endeavour. Endowments from among the largest and most innovative companies as well as governmental agencies and international institutions would ensure the financial and managerial independence of the mechanism and access to technological resources external to Africa.

2. Guest speakers

4. Following the keynote speech, three guest speakers representing the entrepreneurial point of view made presentations. The guest speakers were:

- Mr. Samir Marrakchi, President and Director-General of the Société de Participation et de Promotion des Investissements (SPPI), Tunisia;

- Mr. Viorel Catarama, President and Director-General of Elvilla International, Romania;

- Mr. Joseph Brenner, Development Consultant, Du Pont de Nemours International, Switzerland.

5. The guest speakers discussed foreign direct investment and technology transfer to developing countries and countries in transition.

6. Mr. Marrakchi stressed that technological developments were becoming more and more complex, thus widening the gap between countries. Consequently, the cost, time required and form of technology acquisition differed between developed and developing nations. He described both successes and failures in Tunisia's changing economic strategies. Thus, a project with a European partner had failed because of the complexity of the acquired technology, differences in strength between the partners, dependence on subcontractors which had led to cost variations, and lack of an industrial network to back up the project. Another project, where production concentrated on a less complex single component and where the Tunisian company had total mastery of the production chain, had succeeded. The speaker concluded that developing country firms needed to analyse their domestic environment objectively before entering into partnerships. The ability of partners to cope with technology transfer was vital. A dynamic approach allowing for a continuous and gradual "updating" of technology seemed to constitute a successful strategy.

7. Mr. Catarama described the obstacles experienced by Romania in its attempt to make the transition from a planned to a market economy. Joint ventures with foreign investors and companies were regarded as a means to speed up the process of privatization, but an insufficient legal framework led to abuses, and some joint ventures had been established with little capital for tax purposes only. In other cases, the technology introduced to Romania was already obsolete in the West. However, experience was increasing, making it easier for the country's firms to assess proposed partnerships. The biggest obstacle was the lack of material and technological resources, as well as funds. Romania needed technology transfer in a variety of sectors such as: banking, customs and tourism in the area of service industries; furniture and textile production in the industrial sector; and agriculture.

8. Mr. Brenner cited successful experiences of his company with technology transfer in 60 countries on all continents. Training and transfer of expertise were part of the process. In past years, the new opportunities in Eastern Europe had led to a particular increase in the flow of technology. Economic and general operating conditions, including the stability of the political climate, were major factors in his company's decision-making as

regards foreign investments involving technology transfer. Adequate mechanisms had to be in place to compensate for higher risks; such safeguards could be provided, for example, through special funds. Companies faced obstacles when their motives were viewed with suspicion and disincentives were put in place discouraging investments. Investments and partnerships needed an environment promoting entrepreneurship, strengthening the private sector and providing a marketplace. Foreign partners could help in setting up a local infrastructure for entrepreneurship.

9. The discussion following these presentations involved interventions by experts from the Netherlands, Switzerland, Morocco and Chile and by a representative of ESCAP. It centred on the possible role of strategic alliances in technological and economic development, the applicability of this model to developing countries and the specific role of small and medium-sized enterprises. It was argued that these would have to join forces in a consortium in order to develop an R & D system relevant to their needs. This was the case for smaller companies even in developed countries. The right kind of institutions and networking opportunities were needed to develop local strength and capabilities.

3. Panel discussion

10. In the afternoon of the first day, a panel discussion was organized during which results from research work carried out in Africa, Latin America and Asia were presented. The discussion was moderated by Professor Mytelka. The panellists were:

- Professor Samuel Wangwe, University of Dar es Salaam, INTECH-UNU;
- Mr. Tom Ganiatsos, Technology Programme, UNCTAD;
- Mr. Jorge Katz, United Nations Economic Commission for Latin America and the Caribbean.

11. In his presentation, Professor Wangwe outlined the main findings of a project on export-oriented firms in Africa. The main objective of the project was to understand how, within a broader macroeconomic and sectoral policy context, firms had been developing their capabilities to survive and compete in export markets. The findings showed that entry into the export market was influenced by: (a) previous experience and exposure of entrepreneurs to export markets and to sources of technology; (b) partnership with foreign firms; (c) employment of expatriate staff; and (d) family networks with members who lived in foreign countries. Training and technology improvements on a continuous basis were crucial for sustained competition.

12. Mr. Ganiatsos reported on preliminary findings from the secretariat's research and technical cooperation project examining technological development and competitiveness in selected East and South East Asian countries. The preliminary findings showed that the contribution of foreign direct investment as compared with other channels for the transfer of technology differed between countries and sectors. It had had a more significant impact in Indonesia, Malaysia and Taiwan Province of China than in the Republic of

Korea, Thailand and Viet Nam. In the latter group of countries, a large part of the transfer of technology and its contribution to local capabilities had been achieved through acquisition of capital goods, technical assistance, contact with equipment suppliers, private consultants and strategic partnering.

13. Mr. Katz, referring to industrial organization and the international competitiveness of firms in Latin America, stressed the importance of looking at the historical context in analysing these issues. He recalled the period of the 1950s and 1960s when technological capabilities had been built up under import substitution regimes, and emphasized the learning process that had taken place during that period. As the internal market had become saturated in the 1980s, it had become necessary to open up economies gradually and utilize the skills and technological capabilities accumulated during the import-substitution period. However, some regulations were still necessary to ensure that local firms responded to international market signals and developed advanced technologies.

14. The expert from the United States of America stated that there was a need to distinguish between firms' and national policies and strategies. To illustrate his point, he referred to the Nintendo Company from Japan which had approached the United States on issues related to intellectual property rights.

15. Mr. Marrakchi pointed out the importance of protecting local industries in the early stages of the learning process. He noted that those stages would be vital for developing the technological capability required to enter the international market.

16. The representative of ESCAP noted that the presentations on Africa, Asia and Latin America did not provide enough information on macroeconomic conditions. He pointed out that experience with conditions in the Asian and Pacific region indicated that focusing on technology alone was not enough. Referring to comments made earlier, he stated that, in the near future, the move to the global market might not be that easy because of the emergence of trading blocs. He wondered whether differences between the development experiences of South Asian and East Asian economies could not be explained by the differences in degree and nature of government intervention and the macroeconomic conditions.

17. Mr. Ganiatsos made two observations. First, East Asian countries had highly stable macroeconomic conditions. Moreover, when intervention occurred it was done in such a way as not to create disturbances in the market. Secondly, it was not a question of import substitution strategy per se but the way in which the strategy was managed. In the East Asian countries, infant industries were encouraged to grow up and adjust to international markets.

18. The expert from Egypt wished to know how R & D centres could be induced to undertake joint research with the private sector, promote knowledge transfer and assist in the identification of appropriate technology. He also wondered whether adjustment programmes in developed economies would lead to the relocation of fewer R & D industries to developing countries.

19. In response to a comment made concerning the comparability of experiences in different regions, Mr. Katz emphasized that there was no single model of development and each country tended to follow its own pattern.

20. Professor Mytelka noted that the important lesson emerging from the experience of the Republic of Korea was that a licensing system should be used to acquire and assimilate technologies rather than simply the expansion of domestic technological capacities. She also indicated that deliberate Government policy was important in forging linkages between R & D institutes and the productive sector.

21. The experts from France and Switzerland emphasized the importance of focusing not only on technology but also on education and training.

22. In response, Professor Mytelka pointed out that, historically, high levels of literacy were associated with higher levels of technological development. She noted that, in line with the increasing knowledge-intensity of production, there was a need for higher literacy rates.

23. The expert from Germany noted that the technologies required for domestic, regional and global market competition could be different. In that respect, it was important not to focus only on global markets but also to examine opportunities for acquiring technologies appropriate to domestic and regional markets.

B. Country case studies

24. Under agenda item 2 (TD/B/WG.5/5), the Ad Hoc Working Group at its second session considered a number of country case studies, which comprised in order of presentation:

(1) China (TD/B/WG.5/Misc.12);
(2) Nigeria (TD/B/WG.5/Misc.6);
(3) Switzerland (TD/B/WG.5/Misc.9);
(4) Philippines (TD/B/WG.5/Misc.17);
(5) Sri Lanka (TD/B/WG.5/Misc.3);
(6) Sweden (TD/B/WG.5/Misc.2);
(7) Netherlands (TD/B/WG.5/Misc.11);
(8) Romania (TD/B/WG.5/Misc.4);
(9) Turkey (TD/B/WG.5/Misc.13);
(10) Chile (TD/B/WG.5/Misc.8);
(11) Argentina (TD/B/WG.5/Misc.10);
(12) Bolivia (TD/B/WG.5/Misc.15);
(13) Venezuela (TD/B/WG.5/Misc.7 and Corr.1);
(14) Brazil (TD/B/WG.5/Misc.22);
(15) Republic of Korea (TD/B/WG.5/Misc.5).

1. Case studies by China, Nigeria and Switzerland

25. In their presentation, the representatives of China outlined some basic elements of the Chinese development strategy which had, inter alia, contributed to enhancing the inflow of foreign direct investment and

technology transfer since 1979. These included: (i) a stable regulatory environment; (ii) the role of Chinese expatriates in the formation of a domestic capital market; and (iii) a human resource base of skilled and adaptable labour. There had also been an important shift in national development policy with the launching of reform and deregulation in December 1978. Since then, a stable and favourable regulatory environment had been created for the successful assimilation of foreign direct investment, which China had received from over 100 countries and regions and which was distributed fairly evenly over a number of industries, in particular oil, coal, engineering, electricity, chemicals, medicine, textiles, light industry and agriculture.

26. Foreign direct investment in China had a number of distinctive features: (i) there was extensive scope for investment projects by transnational corporations; (ii) medium- and long-term investment in China was regarded as a focal point in the overseas investment strategy of a number of transnational corporations, e.g. Motorola, IBM, Xerox, Phillips, Citroën, Matsushita, Mitsubishi and Siemens; (iii) the overall technological content of investment projects had been growing and the investment structure gradually improving, as every district offered useful guidance on the placement of foreign capital; (iv) the range of investment had been constantly expanding and, since 1992, China had revised and relaxed the conditions for foreign investment, including in tertiary industry; (v) different patterns of investment had been used, including joint ventures and wholly-owned foreign ventures, international leasing, cooperative development in certain geographical zones, joint stock enterprises, transnational companies and holding companies; and (vi) whereas the investment regions in the early years of the expansionary policy had been primarily coastal, at present foreign investment had spread both northwards and inland, attracted by the rich natural and human resources.

27. The current strategy of China was characterized by an active policy to encourage foreign investment in advanced technology and to direct foreign capital away from labour-intensive industry towards technology-intensive sectors. Furthermore, the Government was keen on applying a policy of exchanging market access for technology. On the other hand, thanks to the fact that over 60 per cent of FDI came from Chinese expatriates from Hong Kong, Macao and Taiwan, Province of China, the country had managed to produce a number of advanced technologies, especially in machinery, light industry and electronics, which the Government offered as a basis for partnership.

28. One expert from the Netherlands asked what role the Chinese diaspora played in foreign direct investment in China. The expert from China replied that the expatriate community had played a very important role, since it created a bridge between Eastern and Western cultures, and since 60 per cent of FDI originated in Hong Kong, Macao and Taiwan, Province of China. An expert from the United States of America stressed that when China had opened up, the country had begun importing advanced foreign technology to achieve competitiveness, i.e. produce high-quality goods at low prices, rather than continuing an import substitution model. The expert from China emphasized the importance of internalizing foreign technologies before undertaking major

R & D efforts. One expert stated that the Chinese case was not one of export-led development, rather, priority was given to production for the large domestic market, a strategy which then had export ramifications. The Chinese Government in fact offered foreign companies access to its internal market in exchange for technology imports. However, it also urged foreign investors to export.

29. The expert from Nigeria introduced his country's case study, which was based on a survey of 50 firms, domestic, foreign-owned and mixed. The severe economic decline in Nigeria during the 1980s had involved a significant decline in capital formation, in imports of capital goods, and in foreign direct investment, all of which had resulted in a significant deterioration of international competitiveness in manufacturing.

30. The structural adjustment programme initiated in 1986 was seen to have been the single most important factor influencing both technology and investment flows. The exchange rate depreciation had resulted in capital flight and speculative activity which had discouraged productive investment. Thus, the industrial incentives and export promotion schemes that had been implemented had been unsuccessful. While the country had a large labour base, and a range of institutions concerned with training, linkages with the productive sector were weak and the technological infrastructure continued to be insufficiently developed.

31. In response to a question by one expert regarding the existence of linkages, the Nigerian expert stated that effective mechanisms existed for regional cooperation, which resulted in the commercialization of Nigerian innovations in neighbouring countries.

32. Mr. Katz commented that Nigeria appeared to be undergoing consecutive stages of macroeconomic imbalance, stabilization, structural reform and re-establishment of technological capabilities similar to those that many Latin American countries had undergone during the 1970s and 1980s.

33. The expert from the Netherlands noted that in the case of Ghana, foreign direct investment (FDI) had started returning only a decade after the country's stabilization programme had been initiated and wondered if the Nigerian case might show parallels. The expert from Nigeria replied that, in spite of ongoing political changes, the economy was growing and that other problems discussed were temporary in nature.

34. In introducing a report on his country's technology policy, the expert from Switzerland referred to two main aspects: (i) the general economic and legal framework; and (ii) certain promotional measures taken by the State in order to diffuse technology. It was particularly through the establishment of basic conditions favourable to the development of enterprise activity that the Swiss Government promoted innovation. These basic conditions included several to which the Swiss authorities attached special importance: (i) a liberal foreign economic policy; (ii) an open labour policy; (iii) an efficient competition policy; (iv) a moderate fiscal policy; and (v) a well-regulated intellectual property rights framework. Consequently, technology policy was not a domain in itself, but a component of economic policy. In that

connection, the role of the State was to promote technical progress while abstaining from intervention, as it was believed that the incentives inherent in a market economy encouraged innovation better than any direct or indirect promotional measure by the State. One of the pillars of Switzerland's technology policy was its emphasis on advanced and varied training at every level. Such training was undertaken by private educational establishments, associations of employers and employees, or public training institutions. Furthermore, particular attention was paid to the training, including the upgrading of skills, of the trainers themselves, as an integral part of economic policy.

35. Promotional measures taken by the State related to technology diffusion through the establishment of centres of excellence, particularly favouring small and medium-sized enterprises. Switzerland focused on its policy on the following aspects: (i) freedom of research, with well-defined priorities among research institutions, the private economy and the state established through a "bottom-up" approach to ensure that the technological needs of the private economy, especially small and medium-sized enterprises, were satisfied; and (ii) transfer of knowledge between research units, the economy and the Government.

36. One expert from Norway and the representative of ESCAP questioned the concept advanced by the Swiss study of a neutral technology policy, as some selectivity in promotion might be practical in providing a framework for technological development and the achievement of competitiveness. The expert from Argentina wondered about the role of Government in determining technological requirements, particularly in efforts to link research and productive sectors. The expert from Switzerland replied that, while the Government should not decide on the priority of programmes, technology policy could not be neutral. The formulation of programmes and policies was a complex process involving the productive sector, research institutes, universities and the Government, which should take into account the particular needs of the economy and of small and medium-sized enterprises. In this context, the Government's role was that of a catalyst. Initiatives, on the other hand, should be left to the private sector, as their objectives were practical and their focus user-oriented. In Switzerland, Government financial contributions to research were currently limited to 20 per cent of total R & D expenditures. Mr. Katz emphasized in that context that, while Switzerland was currently pursuing a relatively neutral technology policy, in the past that had not always been the case. He thus suggested introducing a historical perspective into the discussion.

2. Case studies by the Philippines, Sri Lanka and Sweden

37. In introducing his country's case study, the expert from the Philippines said that, despite his country's poor economic performance in recent years, since the beginning of 1993 it had started to display strong indications of an upturn. This was reinforced by two important factors, i.e. political stability and participation in the ASEAN free trade area.

38. Foreign direct investment was being encouraged in numerous sectors and a number of incentives to attract such investment were in place as, for example,

a long-standing patent law and a new environmental code. Technological capacity-building was also being given priority to sustain the development process through the Science and Technology Master Plan, developed in consultation with the private and public sectors. This plan comprised a three-pronged strategy for modernizing the productive sector through: (i) technology transfer and commercialization; (ii) upgrading of research and development capabilities; and (iii) developing science and technology infrastructure, manpower resources and science culture.

39. The implementation of this strategy was being operationalized through the Science and Technology Agenda for National Development, Philippines 2000, which brought together the goals of technological capacity-building and improved export performance. Its main items were the selection of 15 export winner sectors; the consideration of basic domestic needs; the development of support industries (packaging, steel and chemicals); and the need to improve productivity in the coconut industry, including research into product diversification. The strategies envisaged to address these items were: the utilization of emerging technologies; increased private sector participation; networking at the domestic and international levels, particularly in and through ASEAN; manpower development; review of policies not directly linked to science and technology but which affected those areas; and technology management. The sources of funding for this programme were at the national level in both the public and private sectors, and at the international level, both bilateral and multilateral.

40. Related issues confronting the private sector included the need to modernize facilities, especially for small and medium-sized enterprises. It had become clear that the Government should, for that purpose, facilitate the access of firms to financing, since venture capital in the Philippines was insufficient. Moreover, considerable efforts were being made to draw into the productive sector scientists currently doing research in public institutions which had little prospects of commercialization. The main instrument used for that purpose was consultancy agreements which, in practical terms, represented an attraction for scientists in the form of additional income.

41. In introducing the case study of his country, the expert from Sri Lanka referred to the importance his country attached to human resources development, particularly at the primary and secondary levels, as a prerequisite for successful technological capacity-building. He stressed the positive impact of liberalization on the rate of economic growth and per capita income and on FDI flows and exports. He then described in more detail recent trends in FDI flows and the regulatory framework governing FDI. He mentioned that a number of incentives had been introduced to promote FDI, and that emphasis was being put on encouraging technological capacity-building by small and medium-sized enterprises. He pointed out, however, that FDI was largely concentrated in a few sectors such as garments and textiles and that his country was interested in the diversification of technology flows.

42. The expert from Sweden made brief remarks concerning the case study of his country which focused on an example of a successful research park, the Ideon Research Park. The park was an example of the concept of a technopolis, which emphasized the relevance of geographical proximity of public and private

research and development centres, rather than proximity between different industrial units. The Swedish experience with technopoles had arisen as a spontaneous phenomenon, resulting from an opportune symbiosis between firms, universities and municipalities at a moment when financing was abundant. There were seven successful technopoles in Sweden. These could accept projects from abroad but provided no scholarships. They were not directly funded by the Government, but by a system of rents or condominium holdings with private sector participation.

43. In the debate that followed the country case study presentations of the Philippines, Sri Lanka and Sweden, the important role of scientific and technological parks (or technopoles) was stressed. These parks facilitated the creation of new technologies and, by attracting FDI, helped to overcome the lack of domestic capital, improve R & D and the human resource base, and generate employment and exports, including those of non-traditional sectors. However, some experts said that attempts at deliberate development of such technopoles had generated mixed results in both developed and developing countries and that it was not clear which factors had led to the success of technopoles in Sweden and the United States. Research was being undertaken in different parts of the world into the factors driving technopoles. In this respect, the need was stressed to establish a close relationship between R & D institutions and industry to achieve a success in the commercialization of R & D results. Of particular importance in this context was the involvement of universities in industrial research through a system of incentives. This objective could also be achieved through improvement of the system of training (more engineers), networking of research institutions at the national and regional levels, optimization of laboratories, etc.

3. Case studies by the Netherlands, Romania, Turkey and Chile

44. The expert from the Netherlands, introducing his country's case study, emphasized three main topics: capacity-building, technology policy and technology diffusion. Technology policy and infrastructure should be market-oriented or demand-driven so that they encouraged R & D institutions to carry out research on real needs articulated by both the market and society. R & D institutions should derive their financial resources from the market more than from the State.

45. In an environment of limited financial resources, as was the case in the Netherlands and even more so in developing countries, priority had to be given to technology diffusion through a network of centres built for that purpose. Such a network would be able to collect information on relevant research and technologies from abroad and bring this information to private businesses, including small and medium-sized enterprises. Another important dimension of technology policy was its selectivity or the capacity to choose priority areas on which the country should concentrate its available financial and human resources. This could be done through technology councils or steering groups comprising representatives of both the private and the public sector, researchers and technology forecasters. This method of selectivity had allowed the Netherlands to build a strong capability in biotechnology.

However, selecting an area on which to concentrate was in itself a difficult task, since ways of finding that area within the market had first to be devised.

46. In presenting the case study of his country, the expert from Romania indicated that the country's legal regime provided incentives for export and in no way hindered imports, thus promoting the transfer of technology to and from Romania. With regard to foreign investment policy, mention was made of three fundamental principles: equal treatment for national and foreign investors, free access to all economic sectors and minimum Government intervention. The contribution of foreign capital and technology to the rehabilitation of the Romanian economy was essential in this period of transition, in particular in sectors such as agro-food processing, energy, transportation, communications, consumer goods and tourism. The Foreign Investment Law of April 1991 provided guarantees and incentives for foreign investors.

47. There were several features characterizing foreign investment in Romania: foreign investors placed their capital, either in kind or in cash, in joint ventures with Romanian companies; the number of such companies was quite large, exceeding 20,000, but the amount of capital invested had been rather modest and heavily polarized, with 0.3 per cent of the total number of companies accounting for 68 per cent of the invested capital; almost all the companies declared themselves to be engaged in several fields of activity in order to seize any opportunity offered by the market, including trade, transportation, tourism, food and agriculture. From the geographical point of view, 86 per cent of the foreign capital came from the OECD countries and, within this group, the European Union member countries accounted for 64 per cent of all invested capital.

48. Almost all industrial branches benefited from capital goods imports as a means of acquiring technology. Domestic research and development activities were carried out mainly in research institutes, which were organized as commercial companies, régies autonomes, departments within régies autonomes or public institutions. The authorities were working on the creation of a new institutional system to ensure application of research findings in the economy through legal and economic incentives.

49. In his presentation, the expert from Turkey indicated that the growth rate of GDP had been more than 8 per cent in 1990, and the share of the industrial sector had increased by 9 per cent. The majority of large firms in the manufacturing industry had acquired their technology from domestic sources, including personnel, machinery producers and other firms, and through licensing agreements. Other sources of technology acquisition included literature surveys and assistance of foreign partners and consulting firms. Learning through exportation, imitation, copying, literature surveys, scientific exchange and participation in fairs was also used. In the initial phase of technology acquisition within large manufacturing industries, foreign firms played a smaller role, and it was observed that firms relied mainly on their own initiative in selecting and applying technology, making use of both

market-based and non-market-based technology sources. Turkish firms accomplished significant technology transfer through their licensers and their foreign partners.

50. Large firms in Turkey had accumulated a great deal of experience in technology selection. The majority of large firms participating in a questionnaire study had indicated that they had worked on the design of machinery and equipment. Most of these design efforts were directed not to new models but to the improvement of foreign samples. These types of design activities had contributed greatly to technological learning. Local design and domestic production activities were encountered more in cases where the technology was standardized and relatively simple. The present technological capability had been achieved in different stages: while in the 1950s there had been a shift from cotton, sugar and cement to other manufacturing industries, the orientation had changed in the 1970s towards encouraging export-oriented activities necessitating the strengthening of R & D and requiring highly skilled manpower.

51. In presenting the case study of his country, the expert from Chile briefly reviewed the macroeconomic context in which technological innovation policy was being designed and implemented. Over the past seven years, annual GDP growth had averaged 6 per cent. Despite the erosion of traditional exports, the export sector had been the most dynamic, and unemployment had decreased to 5 per cent in 1992, the lowest in 20 years. The Chilean technology innovation policy aimed at increasing the country's competitiveness through strengthening the technological innovation capacity of the productive sectors. This had been translated into a programme to modernize enterprises, especially small and medium-sized ones. A set of instruments had been established, inter alia, to facilitate enterprises' access to technical assistance and financial markets, and specific financing mechanisms had been created.

52. At the macroeconomic level, the economy was open to FDI, and a stable environment had been created. Legal and institutional measures had been taken to ensure intellectual property rights, patent protection and quality improvement. Although the advances were remarkable, the challenges were even greater, since competition had increased and new competitive factors had emerged, i.e. productivity and quality. In this context, the development and training of human resources and technological innovation were of crucial importance in the achievement of long-lasting competitive advantages.

53. One expert from the United States of America, referring to the country case study of Chile, emphasized that the most interesting lesson that could be drawn was that competitiveness should only not be achieved at the national level but also at the international level; if comparative advantage had diminished in one sector (copper), other market niches should be found. For instance, Chile was exporting fruit and vegetables to the United States during the winter. Kenya was doing the same, and other countries could follow a similar course. The expert from the United Kingdom also stressed that no country in the world could be self-sufficient in technology, and therefore efforts should be made to avoid the duplication of R & D activities. A study had shown that in Europe 30 per cent of R & D activities were duplicated. An

expert from the United States of America added that the role of the government in transfer of technology was to clear the way for foreign investment and cooperation between R & D institutions and private enterprise.

54. The expert from Germany underlined the need to make provision for the adaptation of technology to local conditions. It was stressed that developing countries should create specific facilities to that end. The representative of ESCAP suggested that R & D institutions should be actively involved in the process of adaptation, for example, through the training of engineers and scientists abroad.

55. The expert from Switzerland from the private sector stated that "technology" could not be reduced solely to R & D. There were often hidden elements that intervened in the process of technology transfer. They were not related to flows from suppliers to recipients but were part of a process of cross-fertilization between parties.

4. Case studies by Argentina, Bolivia, Venezuela, Brazil and the Republic of Korea

56. The expert from Argentina, presenting his country's case study, spoke of the problem of the availability of good indicators for measuring the level of technological innovation and suggested that UNCTAD should continue its research on this matter. Among such indicators, he particularly singled out those related to human resources development, which was the prerequisite for technological development and competitiveness. Of particular importance in this context was the measurement of R & D efforts.

57. Argentina was currently investing only about 0.4 per cent of the country's GDP, which was much less than the Vienna target. The structure of this expenditure, with only about 6 per cent on development and the rest going to basic research, hindered the process of technological innovation. Another shortcoming was the low level of private sector participation in R & D (about 5 per cent). Technological innovation, however, was not only a matter of greater R & D expenditures, but also of the effective use of resources, and of the more active involvement of private enterprises in financing and carrying out such activities.

58. Concerning changes affecting the transfer of technology to developing countries, he mentioned the tendency of some companies to restrain the sale of key technology in order not to create new potential competitors in a globalized market. The necessity to pay particular attention to intellectual property rights in connection with "minor" innovations (utility models), breeders' rights and know-how was mentioned. He presented the results of case studies of two innovative Argentine firms, which had been able to develop technology and improve their competitiveness despite the modest performance of the country as measured by the traditional indicators on science and technology. He concluded that the private sector had a growing role to play in expanding and diversifying the technological system in Argentina.

59. The expert from Bolivia, introducing the Bolivian country study, emphasized that, in 1985, his Government had introduced new economic policies,

including fiscal and monetary measures to reduce foreign debt, the liberalization of trade and capital markets, and privatization of State enterprises. Current problems that needed to be resolved concerned the type of incentives required to promote FDI, mechanisms to improve competitiveness, and measures that could help to formulate an educational policy capable of promoting technological capability-building. Whereas the role of the State was to be instrumental in improving academic capabilities and in furthering regional integration, the role of the private sector, supported by the Government, was to forge links with scientific institutions for joint research.

60. The expert from Venezuela, presenting his country's case study, emphasized the importance of political instability as a factor hampering economic stabilization in his country. In view of the economic deterioration it had experienced, his country needed a basic text containing realistic policy guidelines. As an economy whose driving force was oil, Venezuela had a long-standing history of foreign investment, which was currently spreading into such other sectors as telecommunications. The nationalization of the oil industry initiated in 1980 had led to a massive transfer of technology. Today, 70 per cent of refining took place outside the country, to a large degree through joint ventures. While R & D institutions existed, particularly in the oil sector, companies still showed only a low degree of technical innovation. The elimination of trade barriers and market liberalization were seen as factors enhancing prospects for technological exchange and the formation of strategic alliances.

61. In presenting the case study of his country, the expert from Brazil outlined the role played by the different agents in R & D. The federal Government covered the major part of all expenses in this area, while 25 per cent was covered by local governments, 12 per cent by State enterprises, particularly such large companies as PetroBraz, and only 6 per cent by the private sector. Government policy was primarily oriented towards innovation and new technologies and processes in both traditional and new sectors. The national technological policy objectives included increasing productivity and improving quality, both of which were regarded as the basis for competitiveness. Brazil wanted to attract more FDI, particularly in the form of technology. To this end, specific measures had been taken in recent years to attract foreign investment, which included easing of registration procedures, protection of FDI and improvement of intellectual property rights protection. The experience of Brazil was considered representative of that of other developing countries with similar socio-economic characteristics, in particular concerning the role of the State in improving the legal framework and in generating "externalities" (development of infrastructure, human resources, and scientific and technological capabilities) to attract FDI.

62. In presenting the case study of his country, the expert from the Republic of Korea traced the national development strategy of his country since the early 1960s, which was characterized by heavy reliance on imports of capital goods and a restrictive FDI policy. This approach had proved to be effective in preserving the country's independence from the dominance of multinationals and had preserved the base of nationally owned enterprises.

63. His country's success in the acquisition and development of technology was attributed to two factors: (i) entrepreneurial potential and a highly trained workforce resulting from high investment in human resources development; and (ii) an export-oriented policy, which had the effect of exerting pressure on firms to acquire foreign technology and use it effectively in order to be able to compete in the world market. In parallel, it was through the technical assistance extended by overseas buyers that export products conformed with the technical standards required in the recipient countries.

64. Since the early 1980s, the Government had encouraged the transfer of advanced technology through a liberal FDI policy and other incentive measures.

65. One expert suggested that, within the context of FDI, other aspects of the Government's role should also be considered. He referred specifically to joint ventures when companies first had to reach a licensing agreement with the supplier of technology because technology was not supplied by the foreign partner in all cases. Another issue concerned access to technology by small and medium-sized companies, particularly in the developing countries. He asked for recommendations by the Ad Hoc Working Group on what could be done to alleviate the problem, e.g. through the establishment of their own R & D capacity.

66. The expert from the Republic of Korea underlined the important role played by the Government in giving directions in the field of technology development. In connection with the latter, another expert stressed that in his country companies created consortia in order to resolve technology-related legal problems.

67. In summarizing the main highlights of the Republic of Korea's "success story", the expert from Nigeria called for further discussion on the following questions: (a) what were the factors that accounted for the success of FDI policy in the Republic of Korea while similar efforts had failed elsewhere, and (b) what accounted for the effective use of scientists in technology assimilation and adoption?

68. In the discussion, the expert from Venezuela noted that the present economic situation of many developing countries was characterized by increased indebtedness, structural imbalances in the economy, deterioration in standards of living and income, degradation of the environment, political instability, and dichotomy in the development of State and private sectors. All this hampered the process of technological capability-building in developing countries through national efforts, and thus countries were increasingly relying on FDI as an important source of technology transfer. In view of the stagnation in endogenous technological capability-building, it was necessary for developing countries to work out a viable technological policy based on a realistic approach and taking into account the scientific and social context. It was important to include the educational sector (universities and technological institutes) in the process of technology transfer in order to promote the organization and development of centres of technological innovation within the universities.

69. Other experts stressed the role of liberalization and privatization processes as positive factors enhancing technological capability-building. They also referred to the different roles which the Government and the enterprise sector could play in those processes in that respect. The Government should be more active in technological capability-building, whereas the enterprise sector could be more involved in technology transfer. Other experts highlighted the potential of regional cooperation in enhancing the technological transformation of participating countries, particularly least developed countries.

70. Replying to the questions raised in reference to his presentation, the expert from the Republic of Korea said that the liberalization of FDI policy differed between countries, and that its success also depended upon the global capital availability and the availability of local capabilities. In reply to a question raised by the expert from the Netherlands concerning the role of Government in inducing R & D, he stated that, in general, cooperation between the productive sector and public R & D institutions had been low, although industry had moved in recent years to set up its own universities. He also noted that programmes designed to increase cooperation between industry and research institutions, similar to those operating in the European Union, did not yet exist in the Republic of Korea.

5. General discussion

71. Professor Wangwe observed that the case studies showed differences in the treatment of FDI across the countries studied. While Romania, for instance, gave favourable treatment to foreign investment at the expense of domestic investment, the Government of the Republic of Korea had a history of strong support for domestic industry. Secondly, possibilities for support by OECD countries of technological capability-building in developing countries had not received sufficient attention in the discussions. Thirdly, he noted the particular problems of many African countries, which had not been able to draw longer-term investment commitments. He raised the question of how such investments could be attracted and what role UNCTAD could play in that quest.

C. Workshop on Environmentally Sound Technologies

72. Presenting the report of the Workshop on the Transfer and Development of Environmentally Sound Technologies (ESTs), which had been organized jointly by the UNCTAD secretariat and the Government of Norway in Oslo from 13 to 15 October 1993, the expert from Norway said that the Workshop had aimed at identifying some practical guidelines and policy recommendations on how to achieve the objectives contained in the technology chapter of Agenda 21. The various issues had been discussed under the following general headings: general overview of technology environment issues, supply-side issues, demand-side issues, possible new initiatives, and recommendations and summing-up.

73. He stressed that no attempt had been made to arrive at a definition of EST, since it was very difficult to draw a sharp distinction between environmental technologies and other technologies. Nearly all technologies had some kind of environmental impact, and sustainable development meant a

successful assessment of environmental impacts at the initial planning stage. The role of the private sector in generating and transferring technologies was emphasized with regard to the supply of ESTs. On the demand side, it was generally acknowledged that domestic capability to select, adapt, use and develop technology was a precondition for successfully harnessing imported technology to promote sustainable development. It was underlined that capacity-building for ESTs was not essentially different from capacity-building for technology in general, nor was the relationship between technological progress and competitiveness.

74. The conclusions of the Workshop included a wide array of suggestions. Attention was drawn to a number of initiatives and priority elements that had already been taken up and were in the process of being implemented, sometimes on an experimental basis.

75. In the discussion which followed the presentation, an expert from the United States of America underlined the fundamental role played by the private sector in R & D and dissemination of ESTs. In response to a question by the expert from Argentina concerning the impact of structural adjustment programmes on EST diffusion in developing countries, the expert from Norway said that government intervention in the form of a regulatory and incentive framework played an extremely important role in the diffusion of ESTs. Thus, structural adjustment programmes which aimed at deregulation and reduced Government involvement could also affect the mechanisms available to Governments for EST diffusion.

76. The expert from the Netherlands noted that, even if market mechanisms were not yet conducive to the diffusion of ESTs, demand for environmentally friendly products or products manufactured in a sustainable manner was rising in developed countries. The expert from the United Republic of Tanzania reiterated that capacity-building for ESTs was not essentially different from technology in general and underlined the role of education and training. He also mentioned the need for special mechanisms to diffuse ESTs more broadly in developing countries.

77. The representative of UNIDO described some of his organization's information and technical assistance programmes in pollution prevention and sound production technologies.

D. Secretariat documentation

78. The Working Group discussed the reports provided by the secretariat, namely, "Review of the work of the United Nations system and selected organizations dealing with investment-related technology issues" (TD/B/WG.5/6) and "Fostering technological dynamism: evolution of technology capacity-building and competitiveness" (TD/B/WG.5/7), as well as the bibliographical reference material provided.

79. The expert from the United States of America, while praising the quality of the reports asked for specific formulations in a number of paragraphs to be changed in order to improve their message.

80. The expert from Argentina referred to the areas for further research identified in the secretariat's paper (TD/B/WG.5/7). In his view, there was a need for additional research on linkages between technology transfer and capacity-building. In that context, attention should focus on the emerging channels through which technology was being transferred, such as licensing, joint ventures, etc. He also said that the review of the work of organizations should be more extensive as regards the work of UNCTAD.

81. The expert from Switzerland called for a careful analysis to provide a better idea of possible overlaps in the work of different organizations.

82. Representatives from several international organizations commented on the documents and addressed in more detail the activities of their own organizations. The representative of the International Standards Organization (ISO) emphasized the importance of the role of standards in technology transfer and the need to develop appropriate capacities in developing countries in that respect. The representative of UNIDO referred to his organization's experiences and activities. He focused in particular on the need to identify foreign partners for investments in developing countries, the transfer of environmentally sound technologies and the provisions in the Yaoundé Declaration regarding the promotion of investment and technology. The representative of the Centre for Public Enterprises cited the role traditionally performed by such companies with regard to technology and industrial investments. The current privatization process in developing countries and economies in transition often neglected existing R & D capacities in public enterprises, considering them to be unproductive elements. He urged UNCTAD to focus on ways of building on existing technologies and capacities in that process and of developing strategic partnerships among enterprises as an alternative to direct foreign acquisition. The representative of UNESCO offered to contribute to the work of the Group and the secretariat the experience of his organization in the area of science and technology innovation policy and a number of other activities ranging from publications to training programmes. The representative of ESCAP provided information on ESCAP's draft action programme on regional cooperation in endogenous technological capacity-building for investment-related technology transfer involving an enhancement of inter and intraregional technology flows, the promotion of technology transfer from the more advanced to the less advanced countries, and the provision of national economic climates conducive to the acquisition of technology and technical cooperation among developing Asian and Pacific countries. Collaboration with regional and international organizations would be required during its implementation.

ANNEX II

Informal discussions at the third session of the Ad Hoc Working Group on the Interrelationship between Investment and Technology Transfer (21-25 March 1994)

Summary report prepared by the UNCTAD secretariat

A. Keynote address, guest speakers and panel discussion

1. Keynote address

1. The informal discussions of the Ad Hoc Working Group opened with a keynote address by Mr. Hari Shankar Singhania, President, International Chamber of Commerce, on ways and means of creating an environment conducive to foreign investment and technology transfer in developing countries. Over the past three decades, there had been a remarkable change of attitude in both developed and developing countries regarding the impact of foreign capital flows and the potential importance of technology transfer through foreign direct investment (FDI) on the development process.

2. Although FDI had accelerated rapidly over the past two decades and was being increasingly welcomed, perceptions regarding technology transfer associated with FDI were more controversial, owing to adverse effects associated with displacement or technological unemployment and degradation of the environment. Concomitantly, the notion of technology had been expanded to include technology management. In the 1990s, much had changed as both developing countries and countries in transition were seeking to attract FDI (perceived as preferable to commercial borrowing). Transnational Corporations (TNCs), as the main providers of foreign capital and technology needed, however, to assume certain obligations vis-à-vis the host countries and to abide by local rules and laws. In this context, the Guidelines on the Treatment of FDI issued by the World Bank have been useful in outlining standards of fair and equitable treatment for all investors regardless of national origin. Similarly, the World Industry Council for Environment had been set up by the International Chamber of Commerce (ICC), as an international forum for establishing environmental standards and working towards sustainable development where leading TNCs could work with Governments and organizations toward attaining these goals.

3. The most effective types of technology transfer resulted from joint efforts by the TNCs and the host Governments. Such partnerships helped to create the prerequisites for enhancing and diffusing new technologies. This was achieved through active encouragement of market processes, directing domestic savings towards the building up of human skills, strengthening of infrastructure such as electric power networks, roads, ports and telecommunications, and through ensuring that the fruits of progress were fairly distributed among the population. On the question of displacement due to technological change, the reality was that technology was a vital factor in sustained economic growth although there were adjustment costs in this process. In order to cushion the adverse

effects of rapid technological change, safety nets were important but increased investment in education and life-long training - in both developed and developing countries - was essential.

4. The case of highly successful East Asian countries offered striking examples of the main factors that encouraged foreign firms to increase the flow of foreign investment and technology. These economies had successfully combined policies to strengthen their domestic economic base with foreign know-how, which enabled them to shift from initial import substitution to a dynamic export orientation. The "tigers", for instance Japan and the Republic of Korea, acquired front-line technology through licensing, which was absorbed and improved upon by innovation, whereas Singapore, Taiwan Province of China and the "cubs" developed their technological capabilities through attracting foreign investment.

5. Among the principal factors that encouraged foreign firms to increase the flow of investment and technology to the host countries, certain domestic conditions were critical. They included: political stability; a sound macroeconomic environment; predictable entry and exit of capital; wages, workers' skills and overall labour legislation; size and potential of the domestic market as well as export possibilities; infrastructure for production, distribution and export; and, above all, a commitment to growth.

2. Guest speakers

6. Following the keynote speech, five guest speakers representing the enterprise sector made presentations. The guest speakers were:

- Mr. Emerson Kapaz, Pensamento Nacional das Bases Empresariais, Sao Paulo, Brazil
- Mr. Strive Masiyiwa, Retrofit, Harare, Zimbabwe
- Mr. Herman Montenegro, Chamber of Commerce and Industry, Manila, Philippines
- Mr. John Morton, British Technology Group, London, United Kingdom
- Mr. Roger Short, Small Enterprise and Local Economic Development Association (SELEDA), Bologna, Italy.

7. The guest speakers discussed enterprise sector experiences and perceptions on foreign direct investment, technology transfer and technological capability-building.

8. Mr. Emerson Kapaz outlined the impact of globalization on the enterprise sector, particularly Small and Medium-sized Enterprises (SMEs). Changes in the structure and style of enterprise management had led away from vertical and hierarchical models towards more horizontal management systems and network relations in line with the predominance of new systems of production. This change in management style was in part the result of increased reliance on subcontracting all along the value added chain, similar to the style

practised in Japan. Subcontracting now played a more important role as a critical conduit for technology transfer. Moreover, because of the speed of introduction and application of new technologies, there was a lag in solving the problem of unemployment, which remained a critical issue in most developing countries. The necessary domestic preconditions for successful foreign investment which had been outlined by Mr. Singhania did not yet exist and still needed to be created. Investment in education and training should be underscored as it was of critical importance. Most developing countries still had a long way to go in terms of achieving the necessary levels of education, training and infrastructural development before attracting foreign investment.

9. Mr. Masiyiwa discussed the experiences of African private enterprises in the area of technology transfer and technological capability-building, stressing the importance of the partnership between the host country and the technology supplier in achieving the desired objectives. African private enterprises were characterized by several features which hampered the successful transfer of technology and development of technological capacity. The biggest obstacles were lack of skills, information and experienced managerial capacity necessary to effect technology transfer and technological development at the enterprise level. Thus, partnership with technology suppliers, based on mutual respect and common interest, was an essential condition for effective transfer of technology aimed at achieving adaptability and sustainable growth of enterprises and the economy.

10. Mr. Montenegro described the experience of technology transfer and SMEs development in the Philippines where SMEs faced numerous constraints, including the lack of "strategic" expertise and information on export markets and technologies. Solutions to these problems were sought through regional cooperation and, more specifically, the establishment of the Asia and Pacific Economic Council (APEC) which served as a centre for technology transfer and training. More outward-oriented policies introduced by the current administration had created an environment attractive to foreign investment. This could benefit SMEs through joint ventures, market access, technology transfer and capital flows. Moreover, the Philippines Chamber of Commerce had established collaborative arrangements ("twinning programme") with Chambers of Commerce in other countries, notably Japan, with a view to exchanging information on technology and markets and increasing the opportunities for investment and technology flows.

11. Mr. Morton stressed the need to rectify the misconception that intellectual property protection offered benefits mostly to advanced industrial countries. Technology transfer was a two-way process, involving both developed and developing countries. In this connection, he noted that the British Technology Group had identified and successfully commercialized new technologies from countries as diverse as Kazakhstan, Costa Rica and the Republic of Gabon. He observed that, in joint-venture activities or licensing arrangements, the benefits accruing must be mutual for all parties concerned in order to be sustainable.

12. Mr. Short discussed the issue of innovation and internationalization of SMEs and in particular the transnational linkages and service structure

required to develop the technological capacities of those enterprises. He referred to the experience of the Emilia-Romagna region in Italy which had a population of 3 million with a remarkably dynamic economy involving some 300,000 SMEs. In this region, SME-based innovative activity was at a very high level. The important concern was how to bring R & D closer to SMEs. Conversely, a very highly skilled labour force, as exists in Russia today for example, cannot generate full economic benefits for the country concerned if there is little understanding of market mechanisms. Entrepreneurship seeking short-term gains can often result in misallocation of resources and economic loss. He noted that in countries in transition to a market economy, SMEs could play a vital role in economic development.

13. Questions were then raised by Chile, the United States of America, Germany and Bangladesh on, respectively, the relationships between employment and technology, importance of intellectual property protection, the impact of privatization programmes on technology flows and the special needs of least developed countries in foreign direct investment.

14. In his concluding remarks, Mr. Singhania, the keynote speaker, responded that the emphasis put on human resources development through formal education and retraining was well-placed. Indeed partnership, sustainability and adaptability were necessary for successful technology transfer. The globalization of the world economy offered an opportunity for developing countries to link up with the global chain of production, taking into account their own comparative advantages. He reiterated the importance of intellectual property protection for technology flows, saying that such measures were beneficial not only to enterprises in developed countries but also in developing countries and countries in transition. On the relationship between employment and technology, he noted that although the initial effect could be to displace labour, in the long run, technology would generate economic growth and employment. With respect to environmental concerns, there was a need to keep a balance between the protection of the natural environment, economic growth and international trade. He also emphasized the importance of privatization in attracting FDI.

3. Panel discussion

15. The informal discussion continued in the afternoon of the first day as the guest speakers elaborated on the critical issues outlined in their earlier presentations.

16. Mr. Short highlighted the issues related to innovation and internationalization of SMEs, transnational linkages and the service structure required to develop viable enterprises. In order to remedy weak administrative capacities and bring down costs at the firm level, SMEs could entrust specialized enterprises to deal with these tasks. To resolve the problem of lack of information, SMEs could create in collaboration with business associations a shared database yielding market information. In order to support the internationalization of SMEs, structures for the transfer of technology and consultancy capacities needed to be established. Moreover, R & D institutions had to cooperate more closely with SMEs. Low-cost

solutions to strengthen SMEs encompassed the building up and utilization of local capacities, such as, for example, the conversion of military bases into industrial parks in Belarus.

17. Mr. Morton focused on intellectual property rights in technology transfer and development, and the GATT agreement on TRIPS. In response to a comment made concerning the international patent system as part of the "rich nations club" designed to keep out new members, he noted that technology was universally available and recognized no national boundaries. In his view, technology flow was essential for the creation of maximum value for both "exploiters" and "creators" of technology. Using the illustration of "reverse engineering" and best-practised technology, respectively applied by India and the Pacific Rim countries, he argued that developing countries need not necessarily become the "dumping ground" for obsolete technology.

18. With regard to privatization, in his experience ownership per se did not matter; what did count was the relationship between owners and workers, as well as the owner's long-term dedication to the future of the enterprise. Moreover, universities and industry, including SMEs, possessed vast technical expertise that was not fully exploited. The required expertise did not necessarily have to originate from well-known institutions such as the Massachusetts Institute of Technology (MIT) and California Institute of Technology (CALTEC). The wealth of expertise in the former Soviet Union should be turned into products. In order to establish closer international cooperation between public and private enterprises, communications needed to be improved.

19. Mr. Montenegro emphasized the SMEs' role in the process of technological change in developing countries. They were important aspects of this process including: (a) changes in global markets required SMEs continuously to upgrade their technological capacities and their access to market information; (b) regional cooperation could lower costs of procuring expertise in technology and investment while joint ventures could serve in acquiring technology, capital, and market access; (c) UNCTAD could support developing countries in matching SMEs' interests in technology transfer; (d) Governments, the private sector and regional associations should cooperate in providing technical and managerial expertise to support the growing requirements of SMEs, and in devising programmes for education and human resources development. Moreover, they should actively encourage linkages, and could provide revisions to technical education curricula and research.

20. Mr. Masiyiwa expanded on the experience of the Indigenous Business Development Centre (IBDC) in Zimbabwe, emphasizing that the "entrepreneurship transfer" approach had been considered a catalyst to technology transfer in the African region for two main reasons. First, SMEs suffered from lack of access to information to expand the networking capacity at the firm level. Secondly, the "demystification" process should be an integral part of technology transfer. African entrepreneurs wished to be a part of the "global village", and not only in the informal sector in their national economies. The marketability of a product was more important than the equipment acquired. Privatization and ownership were seen as central to success.

21. Mr. Kapaz proposed fully integrated production systems, such as those practised in the textile sector in northern Italy, as a model for SMEs in developing countries. This system was both competitive and cooperative; it was also flexible, comprising individualization and integration of production. He then emphasized the need for greater investment in education and enterprise training for the third industrial revolution.

22. Mr. Leonard Mackey from the United States of America briefly referred to the past work of UNCTAD in relation to intellectual property rights and a code of conduct, stressing the need for an effective intellectual property system to be further developed from a perspective of the corporate executive. There had to be predictable benefits as a result of technology transfer. A number of determinants figured in the considerations of a corporation, including: (a) responsibilities to corporations; (b) responsibilities to shareholders; (c) profit-making; (d) guaranteed repatriation of royalties. In summary, proprietary technology was essential to corporate survival and growth, and thus, technology rights could not be given away or donated.

23. The expert from Chile asserted that the specific needs of least developed countries in the areas of technology and investment needed to be given greater attention, and that UNCTAD should, in future, address these needs. He also emphasized that all countries had undertaken major efforts to promote the protection of intellectual property.

24. The expert from Germany asked Mr. Morton if any studies were available to illustrate the effects on investment and technology transfer of technologies available in the public domain. The expert from Mexico stressed the importance of information flows. She agreed with Mr. Morton that technology that worked in one country would not necessarily perform equally well in another, but emphasized that problems did exist with regard to access. The expert from Argentina asserted that the question was not whether intellectual property protection was useful or not but the extent and nature of the exclusive rights. Moreover, its implications needed to be analysed; this was an area where UNCTAD could make important contributions. The expert from the Philippines suggested that mechanisms should be developed to reduce the risks involved in the acquisition of technology by developing countries. There was a need for increased system-compatibility in the face of growing proliferation of standards, and mechanisms for sharing the costs of R & D in technology acquisition should be explored.

25. The expert from Switzerland emphasized that the need for technological adaptation implied a continuous effort to protect intellectual property; while there was a potential for partnerships with enterprises for local sourcing, he believed that strategic partnerships were a much more complex venture.

26. The expert from Austria raised the issue of information barriers involved in knowledge transfer for the future "global village" which, inter alia, would be multilingual and hence there was a need to overcome those barriers. In this connection, he advocated harmonization of regulations, technical methods and ethical standards, particularly at the level of national legislation on intellectual property. He also announced that the International Congress on

"Intellectual Property Rights for Specialized Information and Knowledge" organized by UNESCO to take place in Vienna from 21 to 25 August 1995 would deal with these issues.

27. The expert from China maintained that because the environment for technology exchange was not yet mature, a number of questions still remained unresolved. He proposed that the Working Group inquire into which factors would render the international environment more conducive to mutually beneficial cooperation and what partnerships could be established.

28. In commenting on the presentation of Mr. Morton, the representative of the Syrian Arab Republic asked whether technology was not confined to selling consumer goods. The possibilities to link technology transfer with development should be further explored.

29. The representative of ESCAP asked if normally the current patent duration was not too long, considering that most innovations were obsolete after five years.

30. In closing the panel discussion, Mr. Kapaz reiterated the importance offered by this forum to identify the relationship between technological change and structural unemployment, namely, that of the speed of human adaptability which was outpaced by the speed of technological change. He was of the view that entrepreneurs had a major responsibility to ensure that technological change was acceptable to society. The Working Group should identify this problem as one of its fundamental issues.

31. Mr. Masiyiwa concluded that UNCTAD should support SMEs, particularly in the task of covering the costs incurred by promoting technology transfer. He agreed with the assertion that innovation should become part of the enterprise culture, and that enterprises needed to adapt to technological change. The international community needed to recognize the contributions made to innovation by developing countries.

32. In elaborating on a comment made by Mr. Masiyiwa, the Deputy to the Secretary-General of UNCTAD described the EMPRETECH programme designed to assist SMEs to start up, grow and internationalize. He indicated that the programme was operational in 5 Latin American countries, and in 3 countries in Africa and would eventually include 18 other countries. Approximately 2,000 entrepreneurs had received training in business skills and expansion. The former Centre on Transnational Corporations had originated the programme which was now being pursued through UNCTAD. He also introduced UNCTAD's new TRANSTECH programme which was complementary to the EMPRETECH programme. TRANSTECH was intended to promote technological capacities of SMEs for improved competitiveness. The programme would soon be operational and had received the support of the Government of Denmark.

33. Mr. Morton stated that new laws on intellectual property would encourage openness. Patents were mutually beneficial both to the patent holders and to the licensing companies. The time-span between innovation and patent award was still too long; risk could not be abolished entirely; profit mirrored market need. He emphasized that a unified international patent system

replacing national systems could be the answer to various issues raised during the discussions. He also stressed that technology should not only be consumer-product oriented, but encompass other areas such as health care and environmental protection.

34. Mr. Short, in reply to Mr. Masiyawa, asserted that there was scope to explore the bottom-up-approach for international business services in the African region.

B. Country Case Studies

35. Under agenda item 2, the Ad Hoc Working Group considered a number of country case studies, which comprised, in order of their presentation:

(1) Hungary (TD/B/WG.5/Misc.18);
(2) United Republic of Tanzania (TD/B/WG.5/Misc.19);
(3) Egypt (TD/B/WG.5/Misc.20);
(4) Bangladesh (TD/B/WG.5/Misc.14)

A presentation was also made by the expert from Austria.

36. The expert from Hungary structured his presentation around 10 main points: (a) economic history; (b) objective and guidelines of the country's innovation policy; (c) aspects concerning the transformation of the economy; (d) research and development diffusion; (e) reverse transfer of technology, i.e. brain drain; (f) intellectual property rights; (g) institutions bridging the gap between research and production; (h) general trends in technology flows and the effects of privatization; (i) foreign direct investment and technology development; and (j) new strategy for technological development. He stressed the importance of human resources development, considering it a fundamental precondition to attract foreign direct investment and a critical element in the innovation process. He underlined the problem of the brain-drain, and the real loss represented by the expatriation of scientists and technologists. Special mention was made of the privatization process in Hungary. The radical changes in the political structure had led to a healthy and gradual process of privatization of the State-owned sector, which at present represented about half of the productive services sectors. After the first phase of privatization, the Government had set up the State Property Agency with the task of privatizing other State-owned companies. According to Western estimates, 40 per cent of foreign direct investment were being invested in Hungary by means of privatization.

37. In his presentation, the expert from Egypt placed emphasis on the development of R & D and interaction among economic agents in technological capacity-building in an economy more open to the world market. National technology policy should play an important role in technological development, complemented by a number of corrective measures involving structural and legislative innovations. Some such measures already taken by the Government of Egypt included the liberal Investment Law of 1989 and a law on new industrial zones. Unfortunately, the response to these innovations was not adequate, particularly on the side of major TNCs. An essential aspect of the above-mentioned innovations was a drive towards high-quality technical

education, including that through cooperation with foreign partners and local R & D. The major issue was what kind of R & D should be undertaken by local institutions, in addition to technologies transferred through technological partnership to avoid alienation of the local R & D community. Egypt had had some positive experience with local R & D in the public sector, but in the private sector much remained to be done in this area. It was hoped that a new liberalization policy would serve this end. As for FDI, particularly that by transnational corporations (TNCs), Egypt's experience showed that it could be instrumental in the transfer and dissemination of technology, training and applied research. An important line of future action would be to encourage these corporations to conduct original research and establish genuine R & D programmes with local institutions.

38. The expert from the United Republic of Tanzania highlighted the crucial needs of his country for effective technology capacity-building and for setting up a basic infrastructure for human resources development, research and development, as well as investment. His country had made considerable progress in human resources development since Independence in 1961. It had embarked on a primary education and adult literacy campaign; at present, the primary school enrolment rate had reached 70 per cent, with an adult literacy rate of about 90 per cent. This could constitute a great potential for building technological capability in the country. Research and development activities were still very weak, with little research and development work taking place in enterprises, which were giving priority to day-to-day operational requirements. Until the 1970s, the only research and development institutions existing in the country were the agriculture research stations. Further developments in science and technology institutions came in the 1980s, with the establishment of a series of research and development institutions, e.g. the Tanzania Industrial Research and Development Organization, the Tanzania Engineering and Manufacturing Design Organization and the Institute for Production Innovation. However, their effectiveness had been hampered by the shortage of scientific and technical personnel, inadequate funding and budgetary constraints. The weak link between research and development activities in production was demonstrated by the failure to commercialize R & D results, as well as by the failure to tackle the major technological problems facing productive activities in the economy. Such a situation could be explained by the limited relevance of existing R & D to the problems of production in the country, the fragility of the productive sector and its limited financial capacity to engage in new investment. In concluding, he indicated that in the current economic environment, characterized by the globalization of markets, the least developed countries were finding themselves in a particularly difficult position. In spite of important efforts undertaken to that end, they did not yet dispose of the critical tools for effectively supporting their technological capacity and their development initiatives.

39. The expert from Austria spoke about the role of a specialized language, i.e. terminology, in the technology transfer process. He stated that whenever and wherever specialized information was dealt with (i.e. creation, recording, communication, processing for storage and retrieval, translation or transformation for re-use, etc.), a specialized language played a crucial role. Such a language was part of the communications undertaken in the

process of knowledge and technology transfer which could succeed only if the recipients understood the terminology used. Only during the 1980s had terminology planning efforts on a comprehensive scale emerged at national and regional level. However, a systematic approach regarding terminology was necessary in all countries. He advocated that developed and developing countries alike conceive and implement terminology planning strategies in support of: higher education (e.g. by harmonizing textbook contents); knowledge transfer (e.g. in the form of high-quality electronic dictionaries and encyclopedias); research and development; and design. He explained the role played by the International Information Centre for Terminology (INFOTERM), set up by the Government of Austria in 1971 in agreement with UNESCO. INFOTERM had several activities related to the provision of services for efficient knowledge transfer on the basis of terminological methods. It constituted a comparatively small but quite effective contribution to "assistance for self-assistance" within the framework of Austrian ODA.

40. In introducing the case study of his country, the expert from Bangladesh referred to some basic concerns in the area of technology. Regarding human resources development, he stressed the inadequacy of the existing education systems in his country to meet the real needs of industry. There were 58 R & D organizations in different sectors in the country. R & D activities had suffered from shortages of skilled manpower owing to the brain-drain and lack of linkages among universities and R & D organizations. Bangladesh prepared its first National Science and Technology Policy in 1980 which was subsequently revised in 1986. Technological capability in the agricultural sector was better developed than in other sectors. Particular advances had been made in the improvement of seeds. Capability had been developed also in the manufacture of pumps, engines and motors. On the whole, the performance of the public sector had remained unsatisfactory. Failure to curb continued imports of machinery and equipment for which there was local manufacturing capability had hampered technological capacity-building. For example, fertilizer factories were set up as turn-key projects. All procurement of spare parts was based on foreign supply owing to aid conditionality. In concluding, he said that it was essential to have a long-term national technology development plan along with effective policy instruments to encourage investment flow and to facilitate technology transfer.

General discussion

41. Following the presentation of country case studies, various issues were raised. The debate was characterized by broad agreement around the question of technological capacity-building. Numerous delegations, in referring to the studies presented, stressed that a skilled and technologically capable workforce was a major requirement for technological development. To this, the expert from the Republic of Tanzania added that technological partnerships were only possible if partners had equivalent degrees of know-how, which called for the development of local technological capacities in developing countries, particularly the least developed among them. The expert from Cuba explained that education and training for the population as a whole should be considered a fundamental government effort to be undertaken by all countries, independently of their politico-economic systems. The expert from France then highlighted the fact that technological capacity-building was a major stepping

stone in the process of effective technology transfer, and that the learning of terminology was a first step in mastering technology. Two main challenges faced member countries of the Working Group: the problem of technological underdevelopment and the risk of marginalization of LDCs in global development.

42. The experts from China, Hungary and Egypt highlighted the brain-drain issue. It was stated that this problem was associated with the lack of opportunities for career development in the countries of origin. However, some programmes, such as UNDP's TOKTEN had helped to alleviate this problem.

43. The representative of the Economic Commission for Africa noted that in spite of a relatively high educational level and availability of qualified personnel in many developing countries, the real flow of technology to these countries was rather low. He said that elaboration by developing countries of development policies, encouragement of traders to invest more in technological development, putting more emphasis on commercialization of R & D results and establishing a more appropriate climate for investors could be instrumental in remedying the above situation.

44. The representative of ESCAP called on the Working Group to consider how to go about assisting developing countries to develop: appropriate institutions to facilitate investment; appropriate institutions for training; advisory services; quality services; and linkages. He stated that developed countries should be able to assist the developing countries in this endeavour and that the possibility of technical cooperation among developing countries should also be explored.

45. The representative of UNIDO referred to the links existing between technological and entrepreneurship development. Promoting this link was fundamental, he believed, particularly in Africa. However, projects for entrepreneurial development were expensive undertakings for which financial resources needed to be raised. Referring to the expertise and knowledge accumulated by his organization, he drew the attention of delegations to the similarity between issues discussed in the current Ad Hoc Working Group and recent activities carried out by UNIDO. He assured the Working Group of the readiness of his organization to collaborate with UNCTAD on the subjects under discussion.

46. The expert from Germany emphasized the need for cooperation and coordination between UNCTAD and UNIDO as appropriate. The expert from Chile, in reacting to the statement made by the representative of UNIDO, stated that UNCTAD had a long history of involvement in the area of transfer and development of technology, and had accumulated a great deal of information and experience in this area. The Ad Hoc Working Group on Interrelationship between Investment and Technology Transfer established by the Cartagena Commitment was building upon this long-standing experience.

47. The representative of the Latin American and Caribbean Free Zone Association (AZOLCA), a non-governmental organization, underlined the importance of free zones in a region the size of Latin America and the Caribbean as a means to transfer technology and attract domestic and foreign

investment. He therefore suggested that UNCTAD increase its cooperation with, and assistance to, this type of organization which is efficient and competent in dealing with the interrelationship between investment and transfer of technology.

48. The expert from the United Republic of Tanzania said that the presentation of Bangladesh had made a strong case for the needs of the least developed countries, and underlined the problems they faced in the area of transfer and development of technology. The expert from Nepal associated himself with views expressed by the experts from Bangladesh and the United Republic of Tanzania.

49. The expert from Nigeria emphasized that the least developed countries were confronted with an acute problem of finding employment for their qualified personnel, including university graduates. This was attributed to the deteriorating economic environment and lack of linkages between the educational system and the productive sector. There was a need to promote specific industrial and entrepreneurial training. The expert from China wished to see the special concerns of the least developed countries taken into account in the outcome of the work of the Ad Hoc Working Group.

50. In replying to some questions, the expert from Bangladesh stated that financial constraints and conditionalities limited the choices in the acquisition and commercialization of technology.

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